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## **DEPARTMENT OF HEALTH AND HUMAN SERVICES**

### **National Institutes of Health**

#### **Government-Owned Inventions; Availability for Licensing**

**AGENCY:** National Institutes of Health

**ACTION:** Notice

**SUMMARY:** The inventions listed below are owned by an agency of the U.S.

Government and are available for licensing in the U.S. in accordance with 35 U.S.C. 209 and 37 CFR Part 404 to achieve expeditious commercialization of results of federally-funded research and development.

**FOR FURTHER INFORMATION CONTACT:** Licensing information may be obtained by emailing the indicated licensing contact at the National Heart, Lung, and Blood, Office of Technology Transfer and Development Office of Technology Transfer, 31 Center Drive Room 4A29, MSC2479, Bethesda, MD 20892-2479; telephone: 301-402-5579. A signed Confidential Disclosure Agreement may be required to receive any unpublished information.

**SUPPLEMENTARY INFORMATION:** Technology description follows.

Reagent for Mapping Genome-Wide Enhancer-Promoter Interactions

This invention is a research reagent named the “bivalent Tn5 complex” used in transposition-mediated analysis of chromatin looping (TrAC-looping) to determine genome-wide enhancer-promoter interactions during studies of 4D nucleomes in normal development and disease conditions. Enhancer-promoter interactions are key in temporospatial control of gene expression during normal development and pathological conditions. Currently available methods of analyzing genome-wide enhancer-promoter interactions are insufficient in achieving necessary resolution, give rise to false positive artifacts due to *in vitro* ligation steps, or too expensive due to the necessity of sequencing over a billion reads. The instant reagent and associated TrAC-looping technique effectively reduce false positive detection and achieve a 10 to 100-times higher resolution at lower cost for mapping genome-wide interactions between enhancers and promoters essential for the control of gene expression in normal development and pathological conditions.

#### **References:**

- Lieberman-Aiden E et al., *Science* 2009 Oct 9;326(5950):289-93.
- Rao S et al., *Cell*. 2014 Dec 18;159(7):1665-80.
- Goryshin et al., *JBC* 1998 March 273(13) 7367- 7374.

#### **Potential Commercial Applications:**

- Genome wide Enhancer-Promoter mapping
- Functional annotation of genomic structure
- Three-dimensional chromatin organization
- Analysis of 4D Nucleomes during development of diseases
- Identification of key genomic sequences involved in diseases

- Diagnostic for diseases associated with aberrant gene expression

**Competitive Advantages**

- Transposition mediated analysis of chromatin looping

**Development Stage:** Research reagent

**Inventors:** Keji Zhao and Qingsong Tang (both of NHLBI)

**Intellectual Property:** HHS Reference No. E-266-2016/0; -- Research reagent.

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